Diversity in the Actuarial Field

An Honors Thesis (HONR 499)

By

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Abstract

Actuaries coming out of Ball State University share similar hiring seasons and requirements for internships and full-time post-graduate positions. The problem is the playing field is not always even; the requirements may change depending upon the identities an individual may hold. Through interviews with Ball State students and companies who recruit from Ball State, we look into the hiring experiences surrounding actuarial science students. We share the stories and experiences surrounding interviewing for positions as a Ball State student.

As a result of our research, we have learned that the actuarial field seems to be somewhat of an exclusive group. We found several barriers to enter the field. One of these barriers is the process of taking actuarial exams and how expensive this process can be. Another barrier is that many students need to have a strong background in mathematics before they even come to college. If students do not have access to this background in high school, they may have a much smaller chance of making it in the career once they get to college. Certain demographics may be subject to these barriers more than others, making this field somewhat difficult to get into.

In conclusion, we think that the actuarial field needs more effort to truly make it a diverse and inclusive field. As of now, it seems that more privileged people are much more accepted and likely to become successful in the career, while those that are underprivileged may face many more barriers and it will keep them from getting into the career.

Acknowledgments

We would like to thank Dr. Messineo for her help in advising our Thesis. Neither of us had met her prior to asking her to meet with us, and yet she decided to invest her time into our thesis nonetheless. Her knowledge from the Office of Institutional Diversity was vital to us overcoming our actuarial background and doing research into personal experiences. This thesis would have been impossible without her guidance.

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Process Analysis Statement

The process for writing my honors thesis began by choosing a topic that I feel passionate about. I knew that if I wanted to write a thesis, I wanted the topic to be something that actually mattered to me. In the past, I had already considered doing projects on diversity within my field, Actuarial Science. I never thought it would be something broad enough to apply to a lot of people, since it is a very niche field. However, I knew that my thesis would be the end of my collegiate career. Hence, I thought that writing about this subject would be a great way to incorporate all I have learned during my time at school. At the same time, it would be a topic that I could use after graduation since I will be working in the field.

The specific part of diversity within Actuarial Science that interested me was the international students at our school. After having classes with some international students and hearing their experiences, I wanted more people to think about the situation that these students face. From my conversations with international students I learned that a lot of them come to school in the United States and often are not given the opportunity to find a job afterwards (due to sponsorships for companies being expensive). I saw this as an injustice and wanted to learn more about it.

On top of that, I knew that our field was one that was considered a STEM (Science, Technology, Engineering and Mathematics) career and knew that there were still continuing issues with gender in these career paths. One of my great friends, Devin, was very interested in this aspect of our field. Because of our interests, we both decided to explore diversity within Actuarial Science for our thesis's.

The beginning stages of the thesis were quite challenging. Without an advisor, Devin and I both felt a little like we had no concrete direction. We approached a professor to advise the thesis, but he candidly told us that he would know very little about the topic of diversity within our field. After meeting with the Honors College, we received some advice and encouragement that led us to our amazing advisor, Dr. Melinda Messineo. Dr. Messineo had little experience with Actuarial Science, but she is an expert in diversity. This allowed us to stay focused on what actually mattered. She also is very skilled at advising research, so we became more comfortable with starting our process. Devin and I worked extensively on the IRB approval process. This meant figuring out what questions we wanted to ask, who we wanted to interview, how we could most effectively collect data for meaningful results, and seeing what literature and studies were already out there.

I found the current literature and studies available (or lack of them) to be quite interesting. It was clear that the demographics were skewed in favor of white men in the field, so why was no one talking about this issue? Many companies also had policies or statements on inclusive hiring, but they seemed to be vague. This further fueled the flame to make me want to bring light to this subject through our thesis. It also made me more excited to start interviewing students to see if their experience being recruited by companies matched what the companies said they were committed to.

Writing our interview questions was another challenge. We had to have these questions thought out ahead of time in order to get IRB approval, but were still conceiving the general idea of what information we would need to gather. I also think that we focused a lot on the tougher and deeper questions. Hence, when we went back

to review what questions we had, there were some simple ones that we had forgotten. Dr. Messineo was again extremely helpful with this part. She reminded us to let students tell their stories and to leave questions pretty open-ended in order to get a thorough response.

Once IRB approval was finally over, I thought more about how we would be recruiting people to interview. We had told several classmates about our topic. All of these classmates seemed more than willing to participate and generally excited to share their experiences. All along, I knew it would be more difficult to get companies to participate. Many of them may not have time or may feel uncomfortable speaking about negative parts of the company that they work for. In the end, we came up with a system for Devin and I to equally reach out to people and see if they would be interested in participating.

Conducting the interviews was one of the best parts of this experience. Depending on our availabilities, Devin and I would split up who interviewed each person or conduct the interview together. We recorded the interviews and took notes during them as well. I loved getting to hear the experiences that other students had. I especially liked hearing from one graduate student who was also passionate about the topic and how he thought it could be more difficult for graduate students to land a job.

After interviews concluded, it was finally time to start writing the thesis. This was a daunting task. We had received so much information and covered so many different areas that it seemed a little difficult to cover all of them in an organized fashion. Devin did a great job setting up the outline of our paper, and then we split up how we could both write different parts or combine parts if necessary. I focused a lot on the literature

review, discussion of why our topic matters now and in the future, and how the study can be improved in the future.

Overall, we both realized the implications of our study and realized that we were really bringing light to a topic that has not been talked about in our field. It was a little hard to make conclusions based on our small sample size and lack of diversity in that sample size. However, with our interviews and the resources we already had access to, I felt comfortable making judgments about the diversity in Actuarial Science. The ending conclusions made me think about what role I can play in my field as I move towards being a professional. The process also made me feel like I would like to recruit Actuarial Science students from colleges and universities in the future. I would also like to play a role in improving the access to Actuarial Science. For me, this means educating students before they decide on a career path and advocating for more students to have ways to learn about the career.

In conclusion, writing this thesis was difficult but rewarding. Devin and I worked incredibly well together as a team, and I know that this experience will keep us united forever. I feel so proud that I helped create a research paper that will help make a difference in my field, and I hope to continue speaking out on this issue in the future.

Thesis Body

Introduction.

Actuarial Science is a niche major that prepares students to work as an actuary for insurance, reinsurance, or consulting companies. Population density of actuaries is highest in the Midwest and East Coast regions of the United States, with a international population in Switzerland. Actuaries manage and analyze risk. By mobilizing their expertise in analytical skills, business knowledge, and understanding of human behavior they are able to evaluate thresholds for the risks individuals face in everyday life. As a requirement to become credentialed as an actuary, students and full-time professionals take extensive exams through the Society of Actuaries or Casualty Actuary Society. The credentialing process can span from 5-15 years as candidates navigate different thresholds as Actuarial Students, Associates, and Fellows. It is also worth noting that the career of an actuary is linked to significant income opportunities. Starting actuaries can expect to earn between $60,000 and $72,000 after passing one to four exams in college. This professional progression through the exams is the defining objective for actuaries throughout the world, and successful navigation of these thresholds are the goal that professors try to instill in students at universities.

One defining characteristic of the small, highly lucrative field is that that the diversity of the membership does not reflect the broad diversity of the nation. There is an overwhelming number of white actuaries and male actuaries, representing 81% and 70% of total actuaries, respectively (Data USA). Understanding why this occurs is a multi-faceted task that would take extensive research and studies beyond the scope of an Honors Thesis. However, to begin the exploration, the research being done for this

thesis investigates what is the experience of the actuarial hiring process like and what barriers may exist for underrepresented groups, such as women, people of color, individuals from lower socioeconomic levels, and graduate students.

We have chosen to use our own college community as a starting point for this exploration and an initial analysis reveals low diversity. For example, women make up an incredibly small part of our graduating class, just four out of the 16 students. This ratio has actually improved from when our class entered Ball State in 2015, when there were 50 students with less than 10 women. Women in our field have to find their place in our largely male class. Similarly, for people of color, the percentage of students has increased as the class shrunk from students changing their major. In 2015, our class had three people of color, and two of them have persisted to graduation. Women and students of color have had a larger staying power within the field, though this may factor in as to why they become some of the most qualified students from our field.

For students from a lower socioeconomic status, the barriers are even more detrimental however. Our students who have to work consistent jobs to afford the education cannot also afford to take the professional exams. They have issues joining the professional fraternity, Gamma Iota Sigma. They cannot afford to pay the fees to go to conferences that companies recruit from. All of these combine to represent a significant issue with how Ball State's actuaries are supported.

College students have a specific focus on what to do in their time at Ball State. They are taught to pass one to four exams, obtain one to three internships, and learn some of the technical skills necessary to thrive in the actuarial field. Graduate students are taught to try and follow that same track, in less time. These exams, and preparation

materials for the exams, cost $200-500 per exam, creating another factor to hinder student progression. We acknowledge that the actuarial science degree requires a great deal of dedication and persistence for all students, but we aim to explore what extra barriers exist for under-represented and minority students.

Author Positionality Statements

In the interest of full disclosure, we offer the reader statements about our social positions relative to the topic being studied. We are not only interested in this topic as researchers, but also as program participants.

Devin is a senior actuarial science major going to work as an actuarial analyst at a consulting firm in Kentucky, after living in Indiana for the last 18 years. He grew up in a small, predominantly white county near Ball State, with an intense focus on traditional family and religious values. As such, he never understood nor experienced diversity until coming to Ball State, which is still a predominantly white institution (PWI). Exploring diversity further sparked his interest in tying it to his own field.

Ashly grew up in Midland, MI before moving to the Indianapolis area and later attending Ball State University. The contrast in diversity between the three areas led her to consider the benefits of diversity in groups and to also question what makes a place or field diverse. Ashly also worked as a Resident Assistant while attending Ball State University, which taught her about acceptance, diversity, and privilege, making her curious about how these qualities would be viewed in her future career field. Ashly is graduating in May 2019 with a degree in Actuarial Science and will work as an actuarial analyst after graduation in Columbus, Ohio.

Review of the Literature

In order to understand why diversity in the actuarial science field is necessary and relevant, it is important to first become familiar with the field itself and how it operates. According to *Be An Actuary*, a website "designed to help you understand the life of an actuary", actuaries are "part super hero", "part fortune-teller", and "part trusted advisor." The website also describes the benefits of the position in three main categories: playing a role risk management, a great career with great benefits, and being the backbone of financial security. It also states that actuaries use "unbeatable analytical skills" to help protect organizations from risk and loss in the future. *Be An Actuary* also describes where actuaries may possibly work: in insurance companies (the most common), for private corporations who may need to forecast their losses or risk, as consultants, for the government, at colleges and universities, within banks and investment firms, in public accounting firms, labor unions, rating bureaus, and fraternal organizations. As for the location of these jobs, the possibilities are broad. They say that many actuaries "live and work in the Northeast (for example, Manhattan is one of the financial capitals of the world), and the Midwest, where many large corporations are headquartered." On top of those two main locations, actuaries can also find jobs almost anywhere in the United States. Outside of the U.S., Canada is another option: "the options are just as appealing with Toronto, Montreal, and Quebec functioning as the major centers for actuarial work."

Students who are interested in becoming an actuary can pursue a multitude of different majors while in college. Common majors include Actuarial Science, Mathematics or Applied Mathematics, Economics, Statistics, Business, or Finance. *Be*

An Actuary also states that "actuaries come from a variety of educational backgrounds. Actuaries may have majors in areas such as operations research, physics, engineering, and even fine arts." Another question arising around the topic of degrees is whether or not graduate degrees are beneficial. According to *Be An Actuary*, "most actuaries earn a bachelor's degree, but do not pursue advanced degrees." This is because the course materials are the same for a bachelor's program and a master's program, so actuaries would only pursue a master's degree if their bachelor's degree is in a related field.

Although there are many options for majors in college, one consistent qualifier that is needed to become an actuary is the ability to pass the exams. *Be An Actuary* addresses this by saying, ". If you are able to pass one or more of the preliminary exams, that will demonstrate to potential employers that you have the aptitude, interest, and commitment to be an actuary, regardless of your major." The exams can be taken in any order, and the amount of total exams that a person may take depends on the specific track that they decide to pursue. However, most of the exams build upon information that is covered on the first few exams. There are several tools available to study for exams. A common resource is the online resource *Coaching Actuaries*, which allows people to take many practice exams and even learn the material. Some sites provide student discounts for to help keep the resource affordable. The generally held guidelines, according to personal experience as well as *Be An Actuary*, for studying for these exams is that it takes about 100 hours of studying to pass one hour of exam. Two of the preliminary exams that students would typically study for and take first are three hours each, meaning that students should anticipate studying for 300 hours before the exam to properly prepare for it.

Ideally, people interested in pursuing an actuarial career would begin the process of studying and taking exams during their undergraduate work. Without having these exams passed, it will be much more difficult for candidates to obtain a job. Employers view the passage of exams as an indication of a candidate's commitment to learning the profession. From personal experience and being students in the field, we have viewed that most employers look for a minimum of one exam passed in order to obtain an internship, but they probably prefer to see two exams passed by more senior undergraduate students.

Once a person has received a position, most companies offer substantial support for their employees to take exams. Many offer exam reimbursements, pay for materials to study for an exam, and can even offer employees opportunities to attend preparation and skills development seminars. Also, many companies will allow people taking exams to use a specified amount of work or business hours to study for the exams. Often times these companies have a structured program to outline these exam benefits. Companies incentivize workers to advance in the exam process by tying salary increases or bonuses to passing exams.

What an actuary is.

There are two main types of actuaries: property and casualty or life and health (also known as financial services). Property and casualty actuaries work on insurance that protects homes, cars, buildings, and other property. Life and health actuaries provide financial services like planning for retirement, life insurance, health insurance, buying and selling annuities, or other financial services. Within these areas, there are different roles that an actuary can assume. Some actuaries work within a risk

management department of the company. Many actuaries serve in a pricing role, where they use math and statistics to compute premiums of policies or price what a product is worth. Others work in valuation, also known as reserving, which determines how much a company should save for, or expect to pay out, in the future. In general, a lot of the work an actuary does is predict what will happen in the future (using data and trends from the past) and using this information to make smart and strategic business decisions. The work is very complicated, and oftentimes actuaries become very skillful in a specific area.

Diversity of actuaries.

Now that the general career path is understood, we can look at diversity of those individual who make up the field. The actuarial industry has very little information available to bureaus, such as the Bureau of Labor Statistics. The total number employed are given as nearly 33,000 employees in 2018, but little demographic information is known about those 33,000 people. In general, there is a large backing by actuarial employers for gender diversity and inclusion, including specific programs to create more room for women to leadership positions. A basic search online using "diversity" as the keyword will generate pages of companies that state they value diversity have an emphasis on recruiting and retaining intentionally. Organizations such as the Society of Actuaries state they "best fulfill its mission when it is diverse and inclusive of all individuals."

Evidence from Data USA (2014 through 2017) suggests that women are joining the industry at near identical rates as men but leave the actuarial industry as much as 15 years earlier than male counterparts. Although there is no specific data to indicate

the reasons for this, one can speculate based on other research of professional trajectories for women why this is the case. One reason may be that women may leave the field to pursue having children and leaving their career to focus on that. There is an article titled "Women in the profession" (2013) written by Kathryn Morgan and publicized by The Actuary, a magazine of the Institute and Faculty of Actuaries, that states the following: "in common with the rest of the corporate world we have the same phenomena of disappearing women at more senior levels." Because these numbers are so high, maybe the industry (and the rest of the corporate world) should question how they can better support women in the field and encourage them to have options to pursue both motherhood and an actuarial career. Also, company recruiters who visit Ball State consistently say that studying for and passing exams becomes much more difficult when a person has a family to take care of which presumably impacts male employees as well as female. Perhaps women feel this burden more than men, and hence they feel discouraged in the exam taking process, leading them to leave the field entirely. According to Dr. Saumya Dave (2019) and a study done at Oklahoma State University and Arizona State University, "At least 70 percent [of the working women] felt more responsible for routine household tasks, being mindful of children's emotional needs and coordinating children's schedules." Hence, if at least 70 percent of women actuaries are feeling the same burden, they would obviously have left time to focus and concentrate on exam taking while also raising a family. If they feel a larger burden, then they are held back from their male counterparts in similar situations. A solution for this could be for employers to support women even more extensively during the exam taking process once they have children. Employers could also lessen requirements (give them

more time to pass exams) so that the burden of having a family and passing exams feels lighter. For example, a 2005 issue of Harvard Business Review has an article titled "Keeping Talented Women on the Road to Success" by Sylvia Ann Hewlett and Carolyn Buck Luce describes some obstacles for women and provides examples of companies that have enacted strategies that help women pursue both a career and motherhood. The authors cite Johnson & Johnson as one company that is active in this area. They allow women to take time off of work while maintaining connections, so that these women can come back to a career without feeling behind or marginalized. The article also calls for more flexibility for women and the cite Lehman Brothers as a company being a good example. The company allows women to have more flexibility, including working from home. "Data USA cites data from 2016 that describes the actuarial profession as 70% male, 30% female. Our study found similar, though not quite as pronounced, finding. We would estimate that our current split is closer to 60% to 40%. Of course this may be the break down as students are leaving college and then the division becomes more pronounced as women leave the actuarial workforce.

The Society of Actuaries and Casualty Actuarial Society have indicated that there is not enough diversity in the field, but the diversity is sought after, suggesting there may be some issues preventing women, people of color, and sexual minorities from joining the industry or staying in the field. Nearly every individual company has a policy that endorses diverse hiring, but not every company has inclusive hiring practices. Data USA shows that as of 2016, 81% of actuaries are white, 11.6% of actuaries are Asian, and 3.7% of actuaries are black (again subject to a risk of small sample size). If these were to resemble the total population of these groups at Ball State alone, they would be

78.3% white actuaries, 1.3% Asian actuaries, and 8.2% black actuaries (Students and Enrollment - Fact Book). Comparing the actuarial breakdown to Ball State's population shows a lack of black actuaries and Asian actuaries. Undergraduate students of color do not come to actuarial science at Ball State.

If these represented the college student breakdown in the United States, they would be 56.9% white, 6.7% Asian, and 13.7% black (Mobile Digest of Education Statistics). These education statistics show Ball State having an overrepresentation of white students, though that is typical in predominantly white institutions. But it shows the same idea, that we do not have enough black or Asian actuarial students in our program. Because of these drastic numbers, it may be interpreted that these diversity efforts are not enough to truly create a diverse field.

Another article from the SOA, dated from 2014 cited the last SOA census of 2005, discussed the percentage of African-American, Hispanic, and Native-American actuaries in the profession. They cited that African-American actuaries make up 2% of the pool, Hispanics as 2%, and Native-Americans as 0.5%. These levels should have risen since 2005, but it is telling that no census information has come out specifically for this in the last 14 years. There are other reports, such as one from *The Actuary Magazine*, that discuss the breakdown of some of the barriers for actuaries that we discuss in our own research such as sponsorships and VISAs. We hope to add some evidence further describing these barriers that we saw in our own research findings.

Research question.

At Ball State, the actuarial program has a diverse student body, but with some clear divisions. The undergraduate program has four women graduating this spring, while the graduate program has around 10. The undergraduate program has only two people of color, both Asian, while the graduate program has only two white students. There are more people of color in the graduate program than total students in the graduating undergraduate class. Given the under-representation of women and minorities in the actuarial professions, we want to gain a better understanding of what the process is like and what barriers exist that hinder students in the actuarial hiring process? Are there behaviors at company interviews that reduce their chances of being hired, and can those barriers be reduced? Students have an expectation of what interviews may be. Companies have their own expectations of how interviews with actuarial students will go. Is there incompatibility between the ideas of students and recruiters have regarding the hiring process? Do students and recruiters feel that students are prepared for interviews noting that classes taken are completely unlike the actual work of the position?

The hiring season for actuaries is a set on an annual cycle, with a focus on hiring during early fall. This can be detrimental to students with no prior knowledge of the hiring season, especially without any immediate intervention by older students or faculty to support the newer students. We aim to research, learn about, and describe the differences of interview experiences for Ball State actuarial science majors.

Methods for Research.

A full year before beginning any research into the subject, we met to discuss completing the thesis together. We compared what parts of our Thesis ideas could work together and what things we would like to incorporate, and once we reached consensus, we obtained approval to work together on a joint thesis. Then the search for an advisor led us to Dr. Melinda Messineo, the interim Associate Vice President of the Office of Institutional Diversity.

Before we could begin any research, we obtained human subjects research approval through the Ball State University Institutional Review Board, or IRB. This process was extensive, especially for two students who worked largely with math throughout our college experience and had little experience with social science research methodology. We began by completing the sixteen module online Collaborative Institutional Training Initiative, CITI, training. We both had to complete the documents independently, and the training consisted of reading about famous research and methods to ensure that we understood the appropriate methods to store data, handle interviews, help interviewees cope with potentially triggering questions, and general techniques to operate ethically when doing research with human subjects.

Then we created all of the required documents. This included: an Informed Consent document that laid out what our study was, what the purpose was, how we would store the information, how long we stored information, and the rest of the details about their involvement in the research. The Study instruments that specifically laid out our questions, to both companies and students. We also created the Recruitment Letter, which was drafted into an email to contact companies that recruited from Ball State University. We created a slightly different version of the Recruitment Letter to send to

our fellow students, though most of the students responded to us in our classes on the usual day-to-day schedule. The general application portion of the IRB documents included a small section of literature review, to explain that our interest was grounded in the literature and would contribute to the general understanding of the experience of actuarial students in the hiring process.

After submitting the IRB application, with CITI training completed, Dr. Messineo helped us prepare for our semester of research and writing while we waited to know if we were approved through the IRB to begin. We discussed how to record interviews and maintain the separation of identifying information and the recording itself. We downloaded the transcription application "Otter Voice" which allows up to 600 minutes of free recording a month. Our decision to use that app was made because Otter voice transcribes the conversation as you record it, and two users can create a joint cloud storage to share together. We also discussed deadlines and ideas for starting, working, and completing this thesis before graduation in a four-month timeline.

The IRB approved our research on our first attempt, and we took a few weeks to celebrate holidays, decide which of us would contact which companies, and which students we each wanted to contact. Once our final semester began, we started interviewing the actuarial students at Ball State about their hiring experience, student experience, prior internships and professional exams passed, and general thoughts on the field we are all about to enter. While handling these interviews, we also sent our recruitment letters to the companies.

After finishing all of our interviews, we gathered the data points into a spreadsheet to analyze and determine what emerged as salient findings. Some of the

data made sense, some was surprising, and will be summarized in the appendices section. We used this data and the stories people gave us from their interviews to draft the body of this paper. We set out with the intention of learning the experiences people had, and how those experiences differed, with interviewing for actuarial positions. Because of the sample size, we are working with qualitative data, and we think the substance of our interviews turned out well.

Findings.

We knew as we started this study that our final sample would be constrained by the fact we were starting from a small population. Since a large quantitative study was not possible, we focused on research questions that were best answered through a qualitative. Our initial goal was to interview at least 10 undergraduate students, three to five companies at a minimum, and 10 graduate students. As the interviews progressed and we continued to screen, the challenges of finding that willing sample became quickly apparent. Graduate students were hesitant to participate, perhaps in part because of language barriers, but possibly also technology barriers, and even just a lack of interest in undergraduate research. We were pleased that we finally had one graduate student willing to interview with us, and their insight was incredible compared to some of the undergraduate students who gave us shorter interviews. They also discussed the experiences of other graduate students, giving light to some of our expectations and some new bits of knowledge we did not have.

One important piece of information is that our general data (as students in the program) is included in the data set, though without as much of the qualitative information. We kept the basics of our exam, interview, and full-time information in with the rest of the anonymous data. Because of the challenges of operating with a small sample size, we decided to include our data to keep the averages as accurate as we could make it but also knew it was important that we disclose that fact.

As a reminder, our thesis investigates what the experience of the actuarial hiring process is like and what barriers may exist for underrepresented groups, such as women, people of color, individuals from lower socioeconomic levels, and graduate

students. While some of the findings were what we anticipated, the data showed a little difference from what we expected as well.

Effects on women actuaries.

The most common form of discrimination identified in corporate environments is the pay gap between men and women. Equal Pay Day occurs every year on a date symbolizing how far into the year women must work to make what men made in the prior year, drawing attention to the wage disparity between men and women for the same job. For all women combined this date is usually early April. This continued wage disparity raises many questions, such as what forces influence the jobs women decide to join or leave, if prior experience plays any role, and what role does parenthood play in those decisions. When the STEM field is roughly 63% men and 37% women (Stockwell), we wondered how gender might play a role in actuarial science at Ball State.

Our sample size is small but the data we gathered is rich and informative. For the current graduating class, we were able to interview 8 men and 3 women going into actuarial positions, and two other male students about their general experience with the degree despite going into a related field. We did not ask any specific questions involving gender, nor did we ask questions that could be interpreted as "leading" that might lead them to that topic. Our only question that could tie at all to gender-based difference in experiences is, "Do you think your experience as an actuarial student is different from that of other students?" It is interesting to note, that none of the women interviewed shared any experience that suggested that they perceived that gender played a role in their interview experience. This may be a case of the women interviewed not knowing

what male applicants experienced or having no other comparison point. But there are mechanisms in the interview process that try to balance gender differences when possible. For example, oftentimes, companies make a point to send a combination of men and women to Ball State for the first round interviews. This is an important first impression strategy that can help give the experience of an equal playing field.

The one comment that tied to gender came from one female student but it was not in connection to her experience directly. It stemmed from her curiosities about the field. The current class is quite open about sharing their starting salaries, and it is widely known that women are making higher starting salaries than the men in our class. Because of this information, which will be included in the **appendix**, she said:

> "I can't help but wonder if the women that are left have just become super qualified... we are few and far between in a field of white men. Because the women do quit the major sooner, and because there are so many men in the field already, I figure the women who stay in the field pass more exams, get a higher GPA, and in general just become more qualified than the average male candidate."

Our own data confirms this finding, that the women have higher average salary as a group than the men. For women, the average salary was $67,666.67 while men earned $63,795.45 across their job offers. Her speculation about the number of exams passed has proven true, as the women in our class have passed more exams on average than their male counterparts, passing 2.67 exams versus 1.75 for men. On the

same average number of attempts, women passed one exam on average more, and the resulting pay gap between men and women seems to have a strong correlation to the exams passed.

Importance of exams.

The preliminary actuarial exams show the strongest correlation to the starting salaries for the 2019 actuarial science class. Assuming one exam passed for everyone, the average salary goes up by $8,838.89, $5,161.20, and $2,450.00 per next exam passed. It appears that salary is linked to passed exams which is a fairly objective measure, assuming that the test does not have any cultural or systemic biases. This seemed to be the case with one exception. There is one outlier from our graduating class. One male is going to work in a data technology position and believes that he obtained the job as a result of his having an actuarial science degree, and his salary is firmly between the two to three exam paygrades. He credited the degree for helping him find a related field, when the exam promotion model did not match his career interests.

In order to obtain an internship, students are taught that they need to pass one exam. To pass an exam, Ball State offers a year-long course on the specific topics from the Society of Actuaries' agenda. These exams are offered every two months, but as college students, the best time to "give up" a few hundred hours of studying is during the summer. Students spend nine months studying in a class for one exam, cram the necessary studying into the summer, and repeat this over the first few years of college.

Students have repeated this idea, trying to squeeze exams into the year on lighter semesters to give them an edge on our classmates. Students who pass a third or fourth exam do so in the middle of the school year, all whom mentioned understanding

the motivation of how to study. If someone passes more exams, they receive higher compensation and are more competitive for the actuarial internships. To earn a full-time position, some companies require one exam, some require two or more, and all companies prefer students with a prior internship. As such, the emphasis on passing these exams is clear and direct. If you pass the exams, your salary is directly affected. This focus is something that students should have drilled into them when they enter the major.

The hiring season.

To focus on the impact of the preliminary Society of Actuary exams, students must understand how important they are for their long-term career goals. As such, we asked a couple questions to draw out what information students knew about the hiring season. "When you came to Ball State, what did you know about the hiring season?" This question prompted some answers that we initially anticipated from our own experiences.

Every single student responded with some variant of "absolutely nothing." A couple quotes, using pseudonyms, include:

"I knew it was early, but I assumed it would be in the spring semester."

Gabe graduating senior

"Nothing, until Gamma Iota Sigma."

Ami, graduating senior

"Absolutely nothing, I just knew it made money in the future."

Abby, graduating senior

"Nothing at all, I learned about it through Gamma [Iota Sigma]."

Casey, graduating senior

"I didn't know what time of year or how easy it would be or how hard it would be."

Codie, graduating senior

The hiring season for actuaries is a set annual cycle, with a focus on hiring during early fall. This can be detrimental to students with no prior knowledge of the hiring season, especially without any immediate intervention by older students or faculty to support the newer students. When the students come in completely blind as to how the hiring season works, including the timeline and the requirements, the curriculum can play a role in explaining how this works. Our interviews indicated that was not the case, however, as no one mentioned learning about the exams or hiring season in class or from professors. They all indicated learning from one of two sources: their peers or Gamma Iota Sigma.

Gamma Iota Sigma is the professional business fraternity for actuarial science, risk management, and insurance. The fraternity is run through the business college, though the majority of the membership consists of actuarial science majors. Gamma Iota Sigma's mission statement is:

> "Through world-class programs, innovative partnerships, critical industry support, expansive campus engagement, and an unrivaled lifelong professional network, GIS leads the sustainable growth and diversification of the insurance industry's student talent pipeline across all functional areas" (About).

Specifically on Ball State's campus, the Phi chapter invites companies from neighboring states to give presentations on campus, interview students, and put some faces to the names of students. These company-involved events take place in September and

October each school year. Before and during these months, Gamma offers workshops on resume writing and interview tips, with a couple programs focused on helping make four-year plans for actuaries. This is the organization that every graduating actuarial science student joined in their time on campus. They all cited the organization as a major reason for them learning about the hiring season, actuarial exams, and the necessity of internships. Some professors mentioned Gamma and told students they should look into it, and some just learned about Gamma when their peers brought it up.

Graduate students.

This timing does cause discrimination against one group in particular. For college freshmen, they can afford to be a little late to the hiring because they have three years to make up for lost time. However, for first-year graduate students, most of whom come from international backgrounds, the hiring season directly harms them. Only one graduate student was willing to interview with us about his experiences, and he talked a little about the experiences of his cohort within the graduate program.

He did not know about the hiring season until the spring semester his first year, when it was too late for him to get an internship. He had already passed an exam by that point, though a lot of graduate students are rushed to try and pass actuarial exams their first year to attempt to compete with undergraduate sophomores or juniors with an exam or two already. Their timeline is much more stringent with little wiggle room. While undergraduate students have 2-3 years to study for exams, practice interviewing a couple years before it matters, and learn about the field, graduate students are forced into an awful circumstance. They begin their entrance into actuarial science and have to immediately interview for an internship with their one available summer.

This is an issue on its own because just like with undergraduate students, he indicated that the graduate students are not informed about the early hiring season until joining Gamma Iota Sigma. They struggle generally to find an internship early on, with the lack of information as one cause, and thus need to take an expedited timeline while taking the exams. Then their second year, while hopefully having one or two actuarial exams passed, graduate students are stacked up against undergraduate seniors with 1-4 exams and 1-3 prior internships. As we will discuss later, companies in the area "see no real difference between graduate students or undergraduate students," so graduate students' harder timeline is given no thought or preparation.

Another factor working against graduate student success is the international background of the majority of our graduate population. As a whole, the actuarial field does not offer work VISAs status or work VISA sponsorship often. The few companies that interviewed with us all referenced the high cost of sponsoring international employees as part of why they do not do so. One retirement consulting firm said, "It is extremely expensive, and there's no guarantee the candidate can follow through because of government restrictions." Another life and health insurance company cited that most companies aim to hire domestically first, and thus to try and sponsor an international employee requires the recruiters to prove there are no qualified domestic candidates for the same position. Because companies are forced to view international students as an immense expense and domestic graduate students are seen as equals to the generally more credentialed undergraduates, graduate students face one of the larger barriers experienced by actuarial students.

Accommodations during interviews.

One question that resulted in information that was not necessarily expected is this: "Have companies made any accommodations to help you feel comfortable?" We developed this question with the intent of determining the degree to which companies reach out to see if a candidate had any disabilities or situations for which they can provide accommodations. This would be one possible indicator of their commitment to diversity and inclusion. For example, we expected to hear that companies asked if candidates needed any sort of auditory support or translator, if they were comfortable walking upstairs, if they could drive to the interview, etc. However, the responses that we received to this question were not in that realm at all. The students that we interviewed mainly answered this question by talking about how interviewers allowed them to feel comfortable throughout the interview. Several students explained that interviewers established a rapport with them before the actual questions of an interview. Several students also made comments about getting taken out to lunch and their meal being paid for by the company. Another subject that was frequently talked about during this question was travel accommodations. Some of the companies that students interview with are out of town, so arranging for travel to the on-site location can be a crucial part of the interview. Students often talked about whether or not the company paid for them to travel to the interview, and how booking the hotel worked for them to stay in the city of the company as well. It seemed like the company always took on the financial responsibility of getting students to the location. This is a positive sign because it removes barriers for those with fewer resources. The companies also pay for the hotel rooms that may be needed if a candidate is staying overnight. Almost all of

the students we interviewed included a comment that the company gave them water throughout the interview. It is interesting that the students thought that was a significant thing that the company could do to help them throughout the interview process, as providing water seems like a fairly basic and easy task. The responses we received demonstrate a great deal about both the students and the companies they were speaking about.

Student interviews.

Student interview experiences had many of the same recurring themes, which seems logical given they stem from the same major and the same school. The differences between candidates mainly came within their background and surrounding activities of the interviews. Every student we interviewed indicated that they had phone, on-site, and on-campus interviews throughout their time at Ball State. Companies clearly followed similar methods of interviewing students. Most students had interviews with companies that visiting campus annually through partnerships with the Ball State Career Center. The center sets up interview booths and acts as a facilitator between the students and the companies. Generally, the companies would give a first-round screening interview at the Career Center before calling to bring students in to an on-site interview.

These interviews are where the differences in student experiences began to appear. Most first round interviews are most similar, but every on-site interview differed in both length and subject matter. Some companies take a more personable approach as they try to genuinely learn who the candidate is as one student shared, "They asked 'What have you done so far and what do you enjoy, what are you interested in, where

do you fit?'" The interviews ranged between three and as high as six hours, and they are in rounds with different groups of interviewers. Another student described the multiple rounds as, "[I] met with 3 different sets of people, about two hours long, in one room. One set had really hardcore questions, the other two were laid back and figuring out how you think and how you tick." Other students described similar experiences with on-site interviews, citing different types of questions and different lengths. Some had interviews with Human Resources representatives, some met with group of Associate Actuaries, and others even had interviews with the Chief Financial Officer or Chief Actuary for the company. When students discussed factors that stuck out from the interviews, they brought up friendly people who asked about their lives rather than just actuarial questions. Largely, students enjoyed getting to pick the brains of the companies just as much as they enjoyed answering questions about themselves.

Positives and negatives of interviews.

We asked one specific question that we hoped would draw a variety of answers from students: "What qualities of an interview experience stand out to you as positive? Negative?" We asked each student this question, and although some had similar answers, the diverse interests of our class still created some variance in their taste about interviews. The two students who have the most exams in our class said their favorite experiences in interviews stemmed from the interviewee getting to know them a little before asking the tougher questions. They wanted to get a baseline of comfort to see how well they "click with other actuaries, because actuaries talk almost in another language sometimes." Some answers were completely isolated though, as one student cited the first-round interview with an HR representative as one of the positives of their

experience. "The HR rep kind of becomes a go-to for your questions and emails, and stays as a major point of contact." This resource was not mentioned by any other student, but served as a reminder that our students have little familiarity regarding what they are getting into when the major and the career have some stark differences.

As for the negatives of an interview experience, the answers started to get eerily similar. "When they give me a cookie cutter interview," "When they ask the same questions about things like strengths or weaknesses," "When they don't care about who you are, and just want the basic information for the next round." Students repeatedly expressed that they did not like the preliminary screening interviews that companies often give. Actuaries as a whole are largely stereotyped to be an antisocial bunch, yet every interview we had pointed to appreciating when the interviews are social and friendly. "I enjoy being treated like a human, that's just important."

Company interviews.

We interviewed companies with a couple direct goals in mind. We asked questions about inclusive hiring practices, differences between graduate and undergraduate students, sponsorship, and interview experiences. The responses were limited to a few companies, all within four hours of Ball State University, so this area has the same small sample limitations as well. For graduate students, both companies reiterated that they see no difference between their candidacy and the undergraduate students' candidacies. On the surface, this is a great sentiment and might even instill hope in some students. But this implies that first year graduate students learning about actuarial exams and the expedited hiring season are seen as equal with sophomore or junior actuarial students with more exams and more experience. Adding in the

sponsorship and visa aspect, being a graduate actuarial science student puts you at a distinct disadvantage.

One of the company recruiters had a clear response about the type of candidates they hope to find. "Really think ahead...Be more proactive. Be personable, know your resume and be prepared to talk through it." The companies claimed to look for sociable people, candidates who are involved around campus and did more things outside of the actuarial exams. Yet they also indicated that the exam requirements are set in stone, and takes an extreme case to look past those. They want candidates who are studious, pass the difficult exams, and do all kinds of extracurricular activities. This candidate is difficult to find among graduate students, and especially for socioeconomically disadvantaged students who have to work with all of their non-class time to pay for school. The exams cost money, school costs money, and a lot of the campus clubs and activities cost money to regularly participate in.

So how does the hiring process work for companies when looking for social, qualified candidates? The companies we talked to use resumes and the campus career center as their screening process. They looked specifically at GPA, exams passed, and prior internship experience. After sorting the resumes and candidates who pass the initial screening, companies begin to differ on their practice. Some companies treat the in-person first interview as the only interview, and after a couple standard interview questions, the recruiters try to gauge if the candidate "fits" with their company culture. Others use the first round interview solely to check how well a candidate knows their business-side, asking questions about their resume, interest in a company, and how they got into the actuarial field. Then they do a second set of interviews on-site where

they have 4-6 hours of different rounds of interviews and test the candidates in areas of expertise. These interviews include things like critical analysis, mathematical ability, general company awareness, personal motivation, and background. The same word comes up a lot for these interviews -- companies care about "fit."

"Fit" is an idea of a candidate resembling the culture a company holds, and can sometimes be a method by which companies intentionally and unintentionally avoid diversity. If the company culture holds a large percentage of middle-aged white men, and a young Asian woman is being interviewed for a position, there may be concerns about her ability to "fit" within the company culture. None of the companies we interviewed expressed worry about this idea, and there is no way to actually test this idea in this current study. Plenty of businesses and schools have aimed for this idea to be thrown out, as this Harvard Business Review article says, "This misguided hiring strategy can also contribute to a company's lack of diversity, since very often the people we enjoy hanging out with have backgrounds much like our own." (McCord). When a company puts so much weight into how someone fits with their culture, how do they use inclusive hiring practices to counter any implicit bias?

One company says they make a point to have a diverse pool of candidates, by experience. Race, gender, none of the basic demographics play a role in their pool. They aim to look for college students, career-changers, and late-starters. When hiring specifically college students, they have no practices for being inclusive, they just hire whoever they deem the top candidate(s) to be. Another company has a specific talent acquisition group that looks into the demographics of candidates being interviewed and

brought in. They report the diverse characteristics through their HR to look into candidates for who they hire next round.

Looking at that idea, we also asked companies how they decide what universities to recruit from. This information ended up being close to our expectations as well. Each company we interviewed looked within a 4-5 hour drive of their location at schools that have an established actuarial club or Gamma Iota Sigma chapter. They look for the schools that have a track record of putting out good actuaries. Another company, based in Louisville, Kentucky, makes a small exception in that they look at schools locally to them, even if they do not have an actuarial program. This puts a large emphasis on students knowing which schools to attend if they want a higher chance at finding employment after graduation.

Company positives and negatives.

One question we asked both companies and students is, "What do you like most about the hiring experience? What do you like the least?" The students answers were discussed earlier, but the company responses were interesting. No company listed the same positives or the same negatives, and they both emphasized completely different parts of the interview process. The Louisville-based company talked about enjoying the opportunity to talk to students in different areas, learn about the universities, and generating ideas for visits on their own. The negatives discussed by their recruiter consisted of personal things such as being away from family for a night or two. Other positives brought up from companies stemmed from a company-view. One recruiter said, "Being a larger company, we allow candidates to give a preference on their location. We have locations all over the country. [Candidates] can move around the

country without having to interview across the country." Their favorite part of the hiring process was the room to allow students to move where they please, based off their own career goals.

Difference in experience.

Just as there are countless degrees and schools in the world, students within the same degree have their own varied experiences operating in the confines of actuarial science. As a whole, we interviewed numerous white men from middle class backgrounds, but they had different experiences operating in the field. We asked students, "Do you think your experience as a student is different from the experience of other students? How so?"

There were some major differences in answers, between all of the students, which in a way was the goal. One student had changed their major from education to actuarial science, and fell behind pretty quickly after missing a full year of math courses. As a result, they had to cram two years' worth of math courses into one year, including a 16 credit hour semester full of strictly math courses. They said that the struggle to catch up was rough because "rather than taking one exam series each year, I had them compounded."

Another student had an immersive-learning project that lasted a full semester, so they could not take any other courses. Because all of the actuarial classes are full-year sequences, they had to take a year off of math classes. Thus, they came back to the major after the break and had to do something similar to the last student we mentioned, by cramming multiple courses into their schedule. There are no kind ways for the

actuarial degree path to allow for semesters like that, despite Ball State pitching their immersive-learning projects repeatedly throughout emails and campus flyers.

Part of the privilege of knowing about actuarial science in high school helps with the transfer of credits. Most of the students we interviewed had credits transfer from their high schools, taking out some of the early classes and guaranteeing they can get into the first math classes planned for actuarial science. For some students, however, this was not the case. They had to take lower level math courses before getting into the first of the actuarial exam courses. This set them back a full year, both academically and professionally. Without the chance to take exams after freshman year, they had to make up for lost time by taking multiple exams in less time, just to qualify for the same internships their peers may have already had.

The final significant experience differentiator stemmed from students' income. A couple students brought this up as factors into their academic success at Ball State because they had seen how some of their peers were affected by needing to work extra. Some students do not need to work throughout school because their school is paid for and they are financially capable of not needing to work a part-time job. Because of this, they have more time available for them to study and focus on the actuarial exams and courses. Whereas, one respondent mentioned that they had a friend who was working 20-30 hours a week with the same course load, and was never able to afford any exam preparation materials. Without those resources, they were not able to pass an exam as easily, and ended up much less successful than others with financial privilege.

Ball State actuaries' final responses.

The final question we asked students was, "Are there any other aspects of hiring that you would like to share?" We left this question open-ended intentionally, hoping it would draw out all kinds of responses from students about different parts of the student experience. This was one of the most humbling but also interesting parts of the interview process because we heard some answers about tips for interviews, including answers like this one:

> "I really loved it, compared to all my friends that aren't in actuarial science. I've had a job before October 15 for the next year where a lot of friends in business are still looking for/accepting jobs [in February]. 50 other people don't have jobs whatsoever. The money is outrageous, and the process is ten times quicker. A lot of the interviews are short interviews. So I really love the actuarial interview process."

The outright positivity that some of the responses brought out of people was interesting because most of our original questions were either hard data, such as salaries or interview counts, or questions about their actuarial background. These questions had set answers. The final question however gave students an opportunity to say what they wished, and most of them chose to be happy and share some pride in finishing a difficult major path.

Many students chose to share suggestions along the lines of interview tips. "Companies aren't looking for your hard skills or achievements. They're looking for your soft skills, what your potential is."

"This is a hard major, and the biggest quality is discipline and keeping your nose to the grindstone. If it was easy, everyone would be an actuary. Don't let it keep you down to fail."

"For the most part, everyone is pretty welcoming and understands that your major doesn't mean you know everything about the career, you're young and trying to work."

Other students took a moment to reflect on their own failures in the degree. One student discussed their own poor track record, saying, "20 interviews, only one offer. But sometimes that's all it takes." We spend so much time in this major fighting to understand mathematical subjects, and taking those concepts even further on our own time to prepare for actuarial exams. We fight and compete with each other to pass as many as we can as quickly as we can, but at the end of this four year journey, every single undergraduate student we interviewed asked something similar. "So what have the other interviews been like?" The moment we ended the official interview, every single student wanted to know about the stories and experiences of our classmates, wondering what everyone is looking into and what they thought of the last four years. For a major deemed to be populated with antisocial and awkward individuals, we found that every student had their own curiosity about the rest of a group who bonded and made it through this degree.

Discussions and implications.

Through our research, we have identified numerous barriers that prevent students from getting into the field. Because of these barriers, certain people have a more difficult time getting into the career and being successful. As a result of these barriers, this career tends to favor people who are more privileged because it does not make a significant effort to level the playing field for everyone to enter. We will now discuss what these barriers are, as well as any solutions we have for the barriers to start to diminish.

First, a key barrier for the actuarial career is the exams that one must take to become an actuary. It is understood why these exams are needed. One must be capable of the material that is tested to be able to handle real world problems. The exams are critical in weeding out potential candidates who may not be able to problem solve or understand the needed concepts appropriately. However, there are many issues that arise because of the required exams. The exams are incredibly expensive. The preliminary ones start out costing over $200, and the exams continue to get more expensive as the process continues. On top of that, it is almost impossible to study adequately without purchasing study materials. These materials can range from $100 to $400 (and probably even more). These expenses can quickly add up while taking exams and students who fail multiple times continue to pay for something that may not provide a return for them. Hence, a student has to be financially able to pay for exams, which are required to get into the field. This is perhaps a key barrier that allows privileged students to be more successful and more likely to move on in the field, which contributes to the overall lack of diversity.

To help alleviate the financial issue, maybe universities and organizations involved with actuarial science should help students pay for exams. Many schools have programs that help students obtain scholarships for them, but it is not a universal resource that is available to every single student. On top of that, these scholarships might only help out students who are already doing well in school (as the most qualified candidates probably get the most help). Better yet, it would be great to see an industry-wide effort to waive the fees or at least lessen them for students to take the exams.

One initial problem that comes to mind when thinking about international students studying Actuarial Science is that they have a much harder time finding employment. Before this study, we had preconceptions that the reason for this was because of the companies. We thought that companies did not like to hire international students due to the fact that they have to pay to sponsor them to work in the United States. As discussed in the portion about interviewing with companies, every company cited the struggles with sponsoring employees. "We could sponsor the visa, but not the green card...we personally spent a years' time to set it up, and it took the government five minutes to shut down the process." Although there may not be any easy solution to fix this problem, we think that schools and employers need to be more transparent about the hiring process with international students. Some of these students may come to school expecting to have the same opportunities as every other student, when this is not actually the case.

Ideally, changes in the system would allow international students to have the same opportunities as everyone else. However, if this is not possible (especially for the time being), then the least that can be done is to be transparent. By informing

international students that they likely will not be able to find a job or opportunities after obtaining their degree, the students can at least reevaluate if coming to school in the United States is the right decision for them. Before moving and paying all of the expenses needed in order to obtain a degree, they should at least be informed of what the job market will look like for them when they are done. They can then, of course, still choose to come here, but at least they will not have false expectations or regret their choice in studying here because they did not know that they would not have the same opportunities as others.

Undergraduate students similarly have disadvantages that they face. Because all students interviewed mentioned learning about the hiring season and the exam process through Gamma Iota Sigma, the math department could help leverage this existing resource by supporting the organization more or adopting some of their events into the early-degree courses. Adding a 4-year plan handout to the beginning of the actuarial math classes, Mathematics of Finance or Calculus I, would open the possibility for students to understand future requirements. Gamma Iota Sigma has charged a fee to join all four years of our time at Ball State, starting at $50 in 2015 to $85 in 2018. There is no assistance to help students pay or waive that fee, and Gamma does not allow non-members to attend their company recruiting events.

One last issue that may be present in the actuarial field is that students often need to have a strong mathematical background before even getting to college in order to be successful. For example, students who do not get the chance to take Calculus in high school are already considered behind in classes as an actuarial science major in college. According to the College Board, the organization that offers AP classes and

testing which allow students to pursue classes like Calculus and obtain college credit while still in high school, they have programs (like reduced fees) to allow students in lower socioeconomic statuses to still partake in the courses. According to The Atlantic (2016), "Fewer than half of all high schools in America offer calculus -- and the kids who don't have access to the math classes are disproportionately students of color." This points out the large discrepancy in who has access to certain courses in our education system and how it may be due to privilege. In the sequence of classes, if a student starts out later, then they will also be taking the corresponding actuarial exams later. There are classes in college that teach the material taught on the exams, so if students are learning the material later, they will be taking the exam later. By taking classes semesters or years after other students, they are not going to have the opportunity to have the same exams passed. Hence, they will not be as qualified as others and will probably not get the same employment opportunities. So, as hard as a student works in college, sometimes they are still dealing with disadvantages that they have from high school or before. Some high schools do not even offer advanced math classes, which is completely out of the control of a student. Hence, this issue is another way that less privileged students will be held back from the field through.

While there will need to be much more research and action to help make the actuarial field more diverse and inclusive, becoming aware of some of the issues can be the first step. By reviewing what is already known about the field and trying to understand the experiences of others, we can make steps towards inclusion. By recognizing the faults in the system, we can work to eliminate potential biases and at the very least validate the troubles and barriers that others have to go through.

Future research.

Although this study was helpful in answering the aforementioned research questions, it is important to note that even more progress could be made upon this study. There are several areas that could be improved in order to give more substantial or reliable results.

In order to improve a study on diversity in the actuarial field, it would be necessary and helpful to have a much larger sample size. While this study did have enough people to document some trends in the responses, it may be hard to apply these findings to the actuarial field as a whole. One contributing factor that may limit the value of our findings is that all students interviewed attended the same university. Also, all of the companies that were interviewed recruit at this same university as well. Hence, they all may have somewhat of the same experience. In order to truly know about the whole actuarial field in general, it may be necessary to conduct a much larger study that applies to all colleges or universities and all companies.

In the same sense of having a larger sample size, it may also be beneficial to have a more diverse population in the sample. Although this study did see some diversity in gender, race, and number of exams passed, it is understood that the sample interviewed in this study may not represent all of the students in the population of the actuarial field.

As mentioned before, we also only interviewed companies that recruit at one specific university. In order to understand the entire field, a future study would need to interview and collect data from many different companies all over. We understand that these specific companies are only representative of a specific area of the country.

Hence, it is very possible that companies in Chicago (which is a much bigger city) view recruiting differently than those in the Midwest.

Additionally, a topic that could be useful to study in the future is learning disabilities. We did not encounter any students with learning disabilities, but we can definitely see how this subject would hinder someone from entering the field. Learning disabilities could make it much more difficult for people to study for and pass the actuarial exams, in addition to studying and obtaining an appropriate degree.

The barriers within actuarial science are clear, though generally left unspoken. No one in our class talked about any of these issues until we brought them up and asked about them. Yet when provoked, students brought up issue after issue with how the program went or how they think it could be improved. When these conversations were this easy to have, we think the time spent to explore the issues is time well spent.

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Appendix A: IRB Project Approval Document and CITI Training

Office of Research Integrity
Institutional Review Board (IRB)
2000 University Avenue
Muncie, IN 47306-0155
Phone: 765-285-5070

DATE:	November 26, 2018
TO:	Devin Tarr
FROM:	Ball State University IRB
RE:	IRB protocol # 1352874-1
TITLE:	Diversity within the Actuarial Science Field
SUBMISSION TYPE:	New Project
ACTION:	APPROVED
DECISION DATE:	November 26, 2018
REVIEW TYPE:	**EXEMPT**

The Institutional Review Board reviewed your protocol on November 26, 2018 and has determined the procedures you have proposed are appropriate for exemption under the federal regulations. As such, there will be no further review of your protocol, and you are cleared to proceed with the procedures outlined in your protocol. As an exempt study, there is no requirement for continuing review. Your protocol will remain on file with the IRB as a matter of record.

Exempt Categories:

	Category 1: Research conducted in established or commonly accepted educational settings, involving normal educations practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
X	**Category 2:** Research involving the use of educational test (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior
	Category 3: Research involving the use of educational test (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under category 2, if: (i) the human subjects are elected or appointed officials or candidates for public office; or (ii) Federal statute(s) require(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.
	Category 4: Research involving the collection of study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

	Category 5: Research and demonstration projects which are conducted by or subject to the approval of Department or agency heads, and which are designed to study, evaluate or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in methods or levels of payment for benefits or services under these programs.
	Category 6: Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed or (ii) if a food is consumed which contains a food ingredient at or below the level and for a use found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture.

Editorial Notes:

1. with signed consent (audio is acceptable if recorded)

While your project does not require continuing review, it is the responsibility of the P.I. (and, if applicable, faculty supervisor) to inform the IRB if the procedures presented in this protocol are to be modified or if problems related to human research participants arise in connection with this project. **Any procedural modifications must be evaluated by the IRB before being implemented, as some modifications may change the review status of this project.** Please contact (ORI Staff) if you are unsure whether your proposed modification requires review or have any questions. Proposed modifications should be addressed in writing and submitted electronically to the IRB (http://www.bsu.edu/irb) for review. Please reference the above IRB protocol number in any communication to the IRB regarding this project.

Reminder: Even though your study is exempt from the relevant federal regulations of the Common Rule (45 CFR 46, subpart A), you and your research team are not exempt from ethical research practices and should therefore employ all protections for your participants and their data which are appropriate to your project.

D. Clark Dickin, PhD/Chair
Institutional Review Board

Christopher Mangelli, JD, MS, MEd, CIP/
Director
Office of Research Integrity

CITI PROGRAM

Completion Date 07-Nov-2018
Expiration Date 06-Nov-2021
Record ID 29371454

This is to certify that:

Ashly Kraatz

Has completed the following CITI Program course:

Social & Behavioral Research - Basic/Refresher (Curriculum Group)
Social & Behavioral Research - Basic/Refresher (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Ball State University

Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w685c61ef-ecfa-443a-b974-41c8d59ef434-29371454

Appendix B: Informed Consent

Study Title ***Diversity within the Actuarial Field***

Study Purpose and Rationale
We are gathering personal narratives about experiences with hiring in the actuarial field. By interviewing with actuaries and new hires, we can tell the story of their experiences in order to contribute to collective research about hiring.

Inclusion/Exclusion Criteria
Participants must be at least 18 years of age and be working, or studying to work, in the actuarial field.

Participation Procedures and Duration
Participants will be recorded answering questions about their actuarial background, hiring experiences, and information related to job offers. Questions will ask students about what led them to the career field, experience with interviews, and hopeful job positions. Questions for company recruiters will ask about inclusive hiring techniques, general practices, and barriers for candidates. The interview will take 15-20 minutes to complete.

Audio or Video Tapes
Recordings of interviews will be kept until completion of the research. Recordings will not be included in the final paper nor will they be kept beyond submission.

Data Confidentiality or Anonymity
All data will be maintained as confidential and no identifying information such as names will appear in any publication of the data.

Storage of Data and Data Retention Period
Data will be secured in password-protected drives and physical items will be held in a lockbox. Any sensitive information will be stored in secured flash drives by the researchers. Upon completion of the research, data will be stripped to total anonymity and identifying information will be deleted.

Risks or Discomforts
There are no perceived risks for participating in the study.

Who to Contact Should You Experience Any Negative Effects from Participating in this Study
Students are invited to the Ball State Counseling Center, at (765) 285-1736 or stop in to Lucina Hall, Room 320. For after-hours crisis/emergency services, call 911 or University Police @ 765-285-1111 to get immediate assistance. Non students are invited to reach out to the National Alliance on Mental Illness 800-950-6264 and the American Psychological Association's locator guide https://locator.apa.org/.

Benefits
There are no perceived benefits for participating in this study.

Voluntary Participation
Your participation in this study is completely voluntary and you are free to withdraw your permission at anytime for any reason without penalty or prejudice from the investigator. Please feel free to ask any questions of the investigator before signing this form and at any time during the study.

IRB Contact Information

For one's rights as a research subject, you may contact the following: For questions about your rights as a research subject, please contact the Director, Office of Research Integrity, Ball State University, Muncie, IN 47306, (765) 285-5070 or at orihelp@bsu.edu.

Study Title ***Diversity within the Actuarial Field***

****

Consent

I, _____, agree to participate in this research project entitled, ***Diversity within the Actuarial Field.*** I have had the study explained to me and my questions have been answered to my satisfaction. I have read the description of this project and give my consent to participate. I understand that I will receive a copy of this informed consent form to keep for future reference.

To the best of my knowledge, I meet the inclusion/exclusion criteria for participation (described on the previous page) in this study.

_____ _____

Participant's Signature Date

Researcher Contact Information

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Appendix C: Questions for Companies

Thank you so much for taking the time to talk with us today. I have about 12 questions and we anticipate that this interview will take about 15-20 minutes. Feel free to ask questions at any time.

1. Tell me a bit about the company you work for?
2. Describe the typical process from start to finish of your interview with an actuarial science student.
3. Does your company have any practices that are related to inclusive hiring? If so, please describe.
4. What are some of the things that interviewers from your company do to help interviewees feel comfortable during the interview process?
5. What role do candidate demographics such as gender and race/ethnicity company play in the hiring process, if at all?
6. When hiring actuarial science students, do you see a difference between undergraduate and graduate student candidates? If so, please describe.
7. Is your company able to sponsor work visas for eligible candidates? If so, how does that process work?
8. How often are you able to sponsor an international student to work at your company (for actuarial science students specifically)?
9. Do your interviews on campus differ from your interviews over the phone or on site? If so, in what ways?
10. How does your company decide which schools you will make visits to while recruiting?
11. What do you like most about the hiring process? What do you like least?
12. Are there other aspects of hiring that you would like to share?

Thank you so much for your time.

Appendix D: Questions for Students

Thank you so much for taking the time to talk with us today. I have about 17 questions and we anticipate that this interview will take about 20-25 minutes. Feel free to ask questions at any time.

1. What are your ethnicity and gender?
2. Tell me what you are most excited about as you enter the actuarial field?
3. What is your age and what year in school are you?
4. If you are a graduate student, what was your Bachelor's degree in?
5. When you came to Ball State for actuarial science, what did you know about the hiring season?
6. Tell me about your experience as an actuarial student. Do you think that your experience as a student is different than the experiences of other students? How so?
7. Have you passed any actuarial exams? If so, what ones?
8. How many interviews have you had?
9. Have companies made any accommodations to help you feel comfortable for longer interviews?
10. Did you have phone, in-person, or on-site interviews?
11. Please describe your on-site interview experience.
12. Did any companies help pay for travel to their on-site interviews?
13. What qualities of an interview experience stand out as positive to you? Negative?
14. Did you interview for companies in a specific area or you were open to relocation?
15. Was the company willing to help with relocation expenses?
16. If you received an offer later on, how long did it take to hear back?
17. Would you comfortable sharing your salary/wage for an internship or full-time offer (if applicable)?
18. When did you receive your offer for an internship or full-time position (if applicable)?
19. Are there other aspects of hiring that you would like to share?

Thank you so much for your time!

Appendix E: Actuary Exam Tables

Demographic Information					Exams			
Race	Gender	Age	Grad/Undergrad	Years of BSU	FM	P	MFE	C
White	Male	22	Undergraduate	4	1	1	0	0
Asian-American	Female	22	Undergraduate	4	1	1	1	1
White	Male	22	Undergraduate	4	1	1	0	0
White	Male	22	Undergraduate	4	1	1	1	0
White	Male	21	Undergraduate	4	1	1	0	0
White	Male	22	Undergraduate	4	0	0	0	0
White	Male	22	Undergraduate	4	1	1	0	0
White	Male	23	Graduate	2	1	1	0	0
White	Male	22	Undergraduate	4	1	0	0	0
White	Female	22	Undergraduate	4	1	1	0	0
White	Female	21	Undergraduate	4	1	1	0	0

Total Passing Each Exam			
10	9	2	1

Percentage of Class Passing Each			
0.91	0.82	0.18	0.09

Total Exams Passed By Breakdowns	
Women	Men
8	14
White People	People of Color
18	4

Appendix F: Actuary Financial Tables

Full Time Salary Offers
$67,500.00
$71,450.00
$64,250.00
$69,000.00
$63,500.00
$68,000.00
$70,000.00
$58,000.00
$55,000.00
$66,750.00
$63,500.00
$60,000.00
$63,000.00
$64,800.00

Salaries by Exams Passed
Average Salary of 1 Exam Passed
$55,000.00
Average Salary of 2 Exams Passed
$63,838.89
Average Salary of 3 Exams Passed
$69,000.00
Average Salary of 4 Exams Passed
$71,450.00

Average Full-Time Salary	Maximum Salary	Average Salary of White People
$64,625.00	$71,450.00	$64,100.00

Minimum Salary	Average Salary of People of Color
$55,000.00	$71,450.00

Average Salary of Men
$63,795.45

Average Salary of Women
$67,666.67